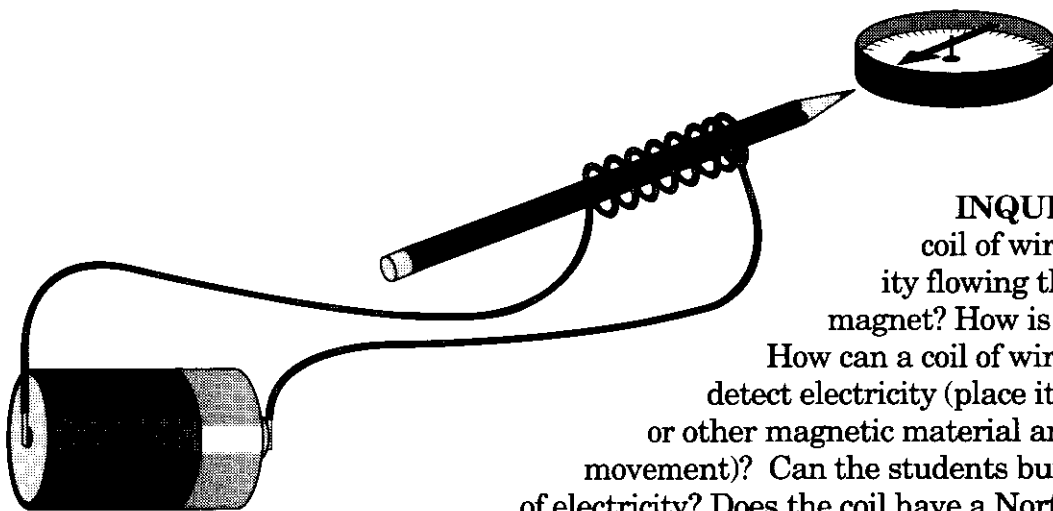


Electromagnetism, Part 1

CONCEPT: *Electricity can make magnets. Students are introduced to a simple way to detect electricity.*

DIRECTIONS/LAB: Have students work in groups of 3 or 4. Hand out lengths of wire (3-4 feet each) and magnetic compasses. Students are to wrap the wire around a pencil or nail to form a coil. They then connect the two ends of a coil to a battery with wires as shown below. Note that the wires have a coating that must be removed from the ends to make electrical contact with the battery. Leaving the wires connected to the battery for periods of more than a few seconds will quickly deplete the batteries.



INQUIRY: How is a coil of wire with electricity flowing through it like a magnet? How is it different?

How can a coil of wire be used to detect electricity (place it near a compass or other magnetic material and observe its movement)? Can the students build an indicator of electricity? Does the coil have a North and South pole like the magnets? How does reversing the wires on the battery terminals affect the coil's magnetic properties. How can we measure the relative strength of "electromagnets"? Does the strength depend on how many batteries are hooked up to the coil? Can anyone design an electric motor?

CONCLUSION: Electricity can be used to produce magnet-like qualities in a coil of wire. Have the students discuss the idea that magnetic properties in the materials from Lesson 8 arise from electric currents inside the material. Can the students think of any ways to test this theory (again, the point here is to get the students thinking, debating, and expressing themselves, not validating or invalidating this proposal)?

MATERIALS: Batteries, compasses, magnets, string, wire, pencils or nails.